

# **The State of Vermont West Nile Virus Surveillance and Response Plan**

**Final Working Plan  
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This plan is based upon CDC's "Epidemic/Epizootic West Nile Virus in the United States: Guidelines for Surveillance, Prevention, and Control", the "New York State West Nile Virus Response Plan", and "The State of Connecticut West Nile Virus Surveillance & Response Plan".

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## Background Information on West Nile Virus

West Nile virus (WNV) is a virus that can infect a wide range of vertebrates. It is closely related to the virus that causes St. Louis encephalitis (SLE). WNV was first isolated in the West Nile province of Uganda in 1937; the first recorded epidemic occurred in Israel during 1951-1954. WNV has a widespread distribution in Africa, West Asia, and the Middle East. Large human epidemics of WN encephalitis have been recorded in South Africa in 1974 and in Israel in 2000. Additional human epidemics occurred in southern France in 1962, in southeastern Romania in 1996, and in south central Russia in 1999. Equine outbreaks occurred recently in Italy in 1998 and in France in 2000.

In late summer 1999, the first domestically acquired human cases of WN encephalitis were documented in the United States in the New York City metropolitan area. During the outbreak WNV-infected birds, mosquitoes and horses were also documented. The discovery of overwintering adult *Culex* mosquitoes infected with WNV during the winter of 1999-2000 predicted renewed virus activity for the spring of 2000

(<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4909a2.htm>).

Surveillance data reported to the Centers for Disease Control and Prevention (CDC) during the 1999-2002 West Nile transmission seasons indicate intensified transmission as well as geographic expansion of the virus.

West Nile Virus in the United States, 1999-2002				
	1999	2000	2001	2002
States with any WNV activity	4	12*	27*	44*
Human Cases	62	21	66	4,156
Equine Cases	25	63	733	14,539
Dead Birds	194	4,315	7,338	16,739
Mosquito Pools	9	483	918	6,604

\*Plus Washington, D.C.

The majority (approximately 80 percent) of individuals infected with WNV experience no symptoms. Approximately 20 percent of those infected develop a mild febrile illness. Less than one percent of those infected with WNV develop severe illness, such as encephalitis or meningitis, which can be fatal in a small percentage of cases. People over 50 years of age, and those with weakened immune systems are at greatest risk for severe illness due to WNV infection. Among the patients in the 1999 New York outbreak, approximately 40 percent of those with encephalitis or meningitis also had severe muscle weakness.

While the vast majority of human infections with WNV are mosquito-borne, newly recognized mechanisms of transmission were described in 2002. A cluster of four WNV

cases in recipients of organ transplants from a common donor represented the first recognized transmission of WNV by organ donation. There is also evidence that WNV can be transmitted through blood transfusion. The Food and Drug Administration has issued a guidance document for deferral of blood donors with suspect or diagnosed WNV (FDA. Guidance for industry: recommendations for the assessment of donor suitability and blood and blood product safety in cases of known or suspected West Nile virus infection, October 2002. [www.fda.gov/cber/gdlns/wnvguid.htm](http://www.fda.gov/cber/gdlns/wnvguid.htm)). The benefits of receiving needed transfusions or transplants outweigh the potential risk for WNV infection.

An investigation of WNV in an infant identified transmission from mother to infant through breast milk as the most likely source of infection (CDC. Possible West Nile virus transmission to an infant through breast-feeding – Michigan, 2002. MMWR 2002;51:877-878). Because the health benefits of breast-feeding are well established and the risk for WNV transmission through breast-feeding is unknown, the Centers for Disease Control (CDC) does not suggest a change in breast-feeding recommendations. The first case of transplacental WNV transmission was also reported (CDC. Intrauterine West Nile virus infection – New York, 2002. MMWR 2002;51:1135-1136). The CDC recommends that pregnant women should take precautions to reduce their risk for WNV.

Like humans, horses infected with WNV can experience asymptomatic infection or illness ranging from mild to severe. Approximately one third of horses that develop severe illness due to WNV infection die or are euthanized.

Unlike WNV in other parts of the world or SLE virus in the Western Hemisphere, WNV in the United States is fatal to a large number of bird species. Mortality in numerous bird species has been documented. Birds in the Corvidae family (e.g., crows, blue jays) are particularly susceptible to the virus, with a mortality rate greater than 90 percent. For this reason, surveillance for dead birds (especially corvids) infected with the virus is the most sensitive method of detecting the presence of WNV in an area.

West Nile virus is maintained in nature primarily by *Culex* mosquito species, which preferentially feed on birds. Numerous other mosquito species have been shown experimentally to be competent vectors for WNV. It is not clear which species play the most important role in human transmission. Different breeding (e.g., in small containers versus in floodwaters) and host-seeking (e.g., preference for birds versus mammals) behaviors of mosquito vector species have important implications for WNV prevention and control. The goal of mosquito surveillance is to determine the distribution, population dynamics, and larval breeding habits of mosquito vectors. Mapping and monitoring larval habitats provides the information required to eliminate mosquitoes at the source through targeted larviciding. Trapping and identifying adult mosquitoes provides information on the distribution and relative abundance of mosquito species that are potential vectors of WNV.

In November 1999, the CDC developed guidelines to direct West Nile virus surveillance, prevention, and control efforts in the eastern United States

(<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4902a1.htm>). Revised national guidelines were issued in 2001 (<http://www.cdc.gov/ncidod/dvbid/westnile/resources/wnv-guidelines-apr-2001.pdf>). This State of Vermont West Nile Virus Surveillance and Response Plan incorporates CDC's guidelines and the recommendations of the Vermont departments of Agriculture and Health to guide the state's disease prevention activities.

## Plan Of Action

The presence of West Nile virus in Vermont was first documented in October 2000, when a hermit thrush found dead in southern Vermont tested positive for the virus. In 2002, WNV activity was widespread in Vermont, with 11 of 14 Vermont counties documenting at least one positive surveillance indicator. A total of 125 dead birds, five horses, and 11 mosquito pools tested positive for the virus. Vermont's first human case of WNV infection was also documented in 2002.

*Culex* mosquito species are known to occur in the State of Vermont (Graham AC, Turnel JP, Darsie RF. New state mosquito records for Vermont including a checklist of the mosquito fauna. J Amer Mosquito Control Assoc 1991;7:502-503). Although their actual range is not documented, experts agree that they probably exist throughout the state.

Information gathered from surveillance activities will inform local policy makers about the level of virus activity and the potential threat to human health. This plan allows the state and local government the flexibility to respond to local situations. The goal of the State of Vermont West Nile Virus Surveillance and Response Plan is to protect public health from an outbreak of WNV. To accomplish this goal, emphasis will be placed on public education about the virus and how it is transmitted, elimination of mosquito breeding habitats, and personal preventive measures to prevent or reduce the risk of exposure.

Adult mosquito suppression programs will only be recommended to local officials as a last resort if surveillance data suggest an imminent risk to human health. Decisions for public health action will depend upon interpretation of the available surveillance data and a number of additional factors, including:

- a) Current weather;
- b) Season of the year (i.e., how long the transmission risk can be expected to persist until mosquito activity decreases);
- c) Feasibility of the planned activities;
- d) Public input on planned activities;
- e) Ecology of the area (e.g., key habitat types);
- f) The human population at risk (urban versus rural, community perception of the relative risk of pesticides versus WNV infection, age demographics); and
- g) Vector species known or believed to be of importance in the area.

The plan uses a graded response according to the risk to public health; each of the three phases of the plan deals with an increasing level of virus detection and management. Phase I activities will be implemented each spring, consistent with the goals of an ongoing arboviral surveillance program. Implementation of Phase II will be considered on an annual basis, depending upon the level of WNV activity in Vermont. The commissioners of Agriculture and Health will recommend implementation of Phase III if all available data suggest an imminent risk to human health. The anticipated

benefits of using pesticides versus the risk of harm to people and the environment from their use, as well as the factors listed above, will be considered. If the use of pesticides to control WNV is anticipated, steps will be taken to inform the local community and to address community concerns.

The Arboviral Task Force was convened in August 2000 to assign individuals and agencies responsible for the activities detailed in this plan. Members of the task force include the Commissioner of Agriculture, the Commissioner of Health, the State Epidemiologist, the State Public Health Veterinarian, the State Entomologist, the State Agricultural Veterinarian, epidemiologists from the Department of Health, and representatives from the State Public Health Laboratory, the Public Affairs Office at the Department of Health, and the Pesticide Advisory Council.

This plan is designed to be part of an overall plan for vectorborne disease management in Vermont. According to the CDC, every state should have, at a minimum, a functional arbovirus surveillance and response capability. Vector surveillance data are critical for determining the appropriate response to a vectorborne outbreak, and also for targeting vector suppression efforts (<http://www.gao.gov/new.items/he00180.pdf>). The establishment of a comprehensive vectorborne disease management program in Vermont is supported by the Vermont departments of Agriculture, Food and Markets; Health; Fish and Wildlife; and Forests, Parks and Recreation.

The plan is based upon the most up-to-date scientific information available. Knowledge gained from subsequent surveillance and research data, both nationally and in Vermont, may result in revisions to this plan.

## Implementation of Plan

### ***Phase I – Core Arbovirus Surveillance Activities***

***Goals: The primary goals of Phase I are to educate the public about West Nile virus and to characterize the extent of West Nile virus activity in Vermont.***

#### **Objective 1: Educate the public about West Nile virus prevention and surveillance activities.**

##### **Activities:**

- A. Develop educational messages with emphasis on personal protective measures for groups at highest risk for serious illness (i.e., individuals over 50 years of age) and on the importance of eliminating mosquito breeding sites. (Vermont Department of Health (VDH), Vermont Department of Agriculture, Food and Markets (VDA))
- B. Update the Department of Health's West Nile Virus Fact Sheet as indicated. (VDH)
- C. Communicate information to the public as needed, including how to report dead birds, how to minimize exposure to WNV vectors, the importance of public cooperation in reducing mosquito breeding sites, integrated pest management for controlling mosquito populations, the proper use of larvicides, the proper use of insect repellants, the agencies responsible for suppression project activities, and how to access the Department of Agriculture's West Nile Notification System. (VDH, VDA)
- D. Respond to public inquiries. (VDH, VDA, USDA Wildlife Services(WLS))
- E. Present proposed mosquito control program to the Vermont Pesticide Advisory Council. (VDH, VDA)

#### **Objective 2: Conduct surveillance for avian mortality associated with WNV infection.**

##### **Activities:**

- A. Disseminate information about the dead bird surveillance system to the public. (VDH, WLS)
- B. Notify Vermont Department of Health district offices, USDA Wildlife Services, Forest Resource Personnel, Fish and Game Wardens, Wildlife Biologists, Foresters, Pest Control Operators, Agricultural Inspectors and Agents, Forest and Agricultural Specialists, UVM Extension Specialists and Agents, and others of dead bird surveillance activities. Instructions on how to collect a morbid bird specimen and where to submit the specimen are provided in Appendix A. (VDH, VDA, Vermont Department of Fish and Wildlife (F&W), Vermont Department of Forests, Parks and Recreation (F&P), WLS)



- C. Maintain surveillance data in the dead bird database. (VDH)
- D. Coordinate the testing of dead birds for WNV. (VDH)
- E. Provide dead bird surveillance data to the public and local officials. (VDH)
- F. Report dead bird surveillance data to the CDC. (VDH)

**Objective 3: Conduct enhanced passive human surveillance for arboviral illness.**

**Activities:**

- A. Disseminate information about the WNV surveillance system to health care providers around the state. (VDH)
- B. Maintain surveillance data on reportable suspect cases. (VDH)
- C. Coordinate the testing of specimens for WNV as appropriate. (VDH)
- D. Provide information on the number of human cases to the public and local officials. (VDH)
- E. Report human surveillance data to the CDC. (VDH)

**Objective 4: Conduct enhanced passive equine surveillance for WNV infection.**

**Activities:**

- A. Disseminate information on equine surveillance activities to veterinarians throughout the state. (VDH, VDA)
- B. Maintain surveillance data on WNV-infected horses in Vermont. (VDA, VDH)
- C. Provide equine surveillance data to the public and local officials. (VDH, VDA)
- D. Report equine surveillance data to the CDC. (VDH)
- E. Disseminate information about the WNV equine vaccine to veterinarians and horse owners throughout the state. (VDA, VDH)

**Objective 5: Conduct adult mosquito surveillance.**

**Activities:**

- A. Collect adult mosquitoes. (VDH, VDA)
- B. Identify mosquitoes to species and separate into pools. (VDA, VDH)
- C. Test mosquito pools for WNV as appropriate. (VDA)
- D. Store untested mosquito pools in the event that viral testing is later indicated. (VDA)
- E. Maintain records of mosquito trap sites, the number and species of mosquitoes collected by location and date, and WNV test results. (VDH, VDA)
- F. Provide mosquito surveillance data to the public and local officials. (VDH, VDA)
- G. Report mosquito surveillance data to the CDC. (VDH)

## **Objective 6: Conduct larval mosquito surveillance.**

### **Activities:**

- A. Map and characterize aquatic mosquito breeding habitats. (VDA, VDH)
- B. Sample mosquito larvae utilizing standard dipping techniques. (VDA, VDH)
- C. Identify larvae to species. (VDA)
- D. Maintain records of the number and species of larvae sampled by location and date. (VDA, VDH)

## ***Phase II –West Nile Virus Activity in Vermont***

***Goals: The primary goals of Phase II are to increase public education efforts and to gather additional surveillance data to inform state and local officials.***

### **Objective 1: Increase public educational activities.**

All activities under Phase I will be continued.

#### **Activities:**

- A. Additional emphasis will be placed on public education directed at reducing mosquito breeding habitats and the use of personal protective measures to minimize exposure to mosquitoes, as well as judicious home use of insecticides and insect repellents. (VDH, VDA)

### **Objective 2: Enhance mosquito surveillance activities.**

Mosquito surveillance activities in a Phase I response will be continued.

#### **Activities:**

- A. Prioritize the areas in proximity to positive surveillance indicators for increased mosquito surveillance. (VDA, VDH)
- B. Identify mosquitoes to species and separate into pools. (VDA)
- C. Test *Culex* and other potential vector mosquito pools from the area near the positive surveillance indicator for WNV. (VDA)
- D. Test previously frozen mosquito pools from this area, if any, for WNV. (VDA)
- E. Continue testing *Culex* pools from other areas for WNV. (VDA)
- F. Maintain records of mosquito trap sites and the number and species of mosquitoes collected by location and date. (VDH, VDA)

### **Objective 3: Conduct enhanced passive human surveillance for arboviral illness.**

Human surveillance activities in a Phase I response will be continued.

#### **Activities:**

- A. Provide updates to physicians, informing them of the positive surveillance indicators and reminding them to submit laboratory specimens for WNV testing and to report arboviral illness to the Department of Health. A high index of suspicion for arboviral encephalitis will be encouraged. (VDH)
- B. Active surveillance will be considered if surveillance data indicate increased risk for human illness, or if a human case is identified. (VDH)

### **Objective 4: Conduct enhanced passive equine surveillance for WNV**

**infection.**

Equine surveillance activities in a Phase I response will be continued.

**Activities:**

- A. Provide updates to veterinarians, informing them of the positive surveillance indicators and reminding them to submit laboratory specimens for WNV testing as appropriate. A high index of suspicion for arboviral encephalitis will be encouraged. (VDH, VDA)
- B. Active surveillance will be considered if surveillance data indicate increased risk for equine infection, or if an equine case is identified. (VDH, VDA)

**Objective 5: Conduct live wild bird surveillance.**

Live wild bird surveillance may be conducted by the USDA Wildlife Services in response to a dead bird that tests positive for WNV. Because resident bird species generally do not travel great distances, serologic evidence of WN infection in a resident bird suggests local transmission of the virus.

**Activities:**

- A. Trap urban house sparrows and other resident bird species (e.g., pigeons) using mist nets, elevator traps, funnel traps, rocket nets, or roundup traps. (WLS)
- B. Obtain a blood sample from each bird according to standard protocols (e.g., National Wildlife Health Center). (WLS)
- C. Coordinate the testing of specimens for WNV as appropriate. (WLS)

**Objective 6: Recommend whether or not to initiate Phase III in the detection area.**

The commissioners of Agriculture and Health may recommend the implementation of Phase III of this action plan in order to protect the public's health. A number of factors (see Plan of Action) will be considered in making the recommendation.

**Activities:**

- A. Assemble officials from the Departments of Agriculture and Health to review all available data. (VDA, VDH)
- B. The commissioners of Agriculture and Health will recommend activities that should be implemented at the local level with State assistance. (VDA, VDH)
- C. Plan one or more of the following (See Appendix \_\_ for information on pesticides reviewed by the Department of Health and identified as most appropriate for use.):
  - 1) Ground/aerial-based larviciding program;
  - 2) Ground-based ultra low volume (ULV) adult mosquito suppression program;
  - 3) Aerial-based adult mosquito suppression program. (VDA, VDH)
- D. Conduct public meetings on proposed mosquito suppression programs. (VDA, VDH)

## ***Phase III - Implementation of Vector Management Program***

***Goal: The primary goal of Phase III is to suppress mosquito populations.***

### **Objective 1: Increase public educational activities.**

All activities under Phase I will be continued.

#### **Activities:**

- A. Additional emphasis will be placed on public education directed at reducing mosquito breeding habitats, the use of personal protective measures to minimize exposure to mosquitoes, and the risks and benefits of pesticide use versus the risk of infection with WNV and potential sequelae. (VDH, VDA)
- B. Disseminate information on larvicide and/or adulticide applications. (VDH, VDA)

### **Objective 2: Implement mosquito larviciding/adulticiding program.**

Larval source reduction in defined areas is the most effective way to prevent transmission of WNV. Adulticiding may be indicated if large numbers of adult mosquitoes are present. Individual situations will be evaluated, and the appropriate suppression method used.

#### **Activities:**

- A. Meet with local officials regarding proceeding with a suppression project. (VDH, VDA)
- B. Search the Department of Agriculture's West Nile Notification System. Provide local authorities with a list of names, addresses and telephone numbers of people registered to be notified in their communities and people requesting to have their properties exempt from spraying. This will assist local authorities in developing and mapping suppression activities and proceeding with proper notification. (VDA)
- C. Assist local officials in conducting informational meetings on proposed mosquito suppression programs. Make public notice at least 24 hours prior to any ground-level or aerial spraying of adulticides. (VDH, VDA)
- D. Secure all permits necessary to conduct the appropriate mosquito suppression program. (VDH, VDA)
- E. Notify State Apiculturist of adulticiding. State Apiculturist will notify beekeepers in the area. (VDA)
- F. Notify the Vermont chapter of the Northeast Organic Farming Association of Vermont. (VDA)
- G. Secure pesticide(s), aerial applicator, and ground-based ULV machinery and enlist certified pesticide applicators to conduct suppression programs. (VDA)
- H. Assemble a ground monitoring crew to deal with environmental issues (e.g., weather, water, wildlife, livestock, non-target and ecosystem effects, organic farms and other crop lands). (VDA)
- I. Apply mosquito larvicide or adulticide. (VDA)

**Objective 3: Implement surveillance for possible health effects of exposure to pesticides.**

**Activities:**

- A. Prospectively collect data on reports of possible health effects related to pesticide exposure. (VDH)
- B. Retrospectively examine data on health outcomes potentially associated with pesticide use. (VDH)

**Objective 4: Assess suppression project efficacy.**

**Activities:**

- A. Continue to assess human, equine, dead bird, and mosquito surveillance data. (VDH, VDA)
- B. Compare pre- and post-suppression mosquito counts. (VDA)

## Appendix A

### Human Surveillance

#### **Who should be tested for WNV{tc "Who should be tested"}**

Hospitalized patients with encephalitis, meningitis of suspected viral origin, or Guillain-Barré syndrome should be tested. Testing is not recommended for persons with mild illness, such as fever or headache, because levels of West Nile virus activity in the community would have to be very high for such symptoms to likely be due to WNV infection. Knowledge of the etiology is not required for establishing a care plan for mild illness. These persons should be advised to seek medical attention if more severe symptoms develop such as confusion, severe muscle weakness, lethargy, severe headache, stiff neck, or photophobia. However, if testing is still desired, the following commercial laboratory offers testing for West Nile virus for a fee:

Focus Technologies, Inc.  
5785 Corporate Avenue  
Cypress, CA 90630  
800-445-0185  
714-220-1900

Specimens should be submitted through local laboratory providers.

#### **West Nile Virus Specimen Collection and Transport{tc "Specimen Collection and Transport"}**

##### *Acute and convalescent serum:*

Collect 7–10 ml of blood in a red-top or tiger-top collection tube. Acute phase serum should be collected on day 10 of illness, as most cases have detectable serum IgM antibody by the eighth day of illness. Convalescent serum should be collected on day 21 of illness; most infected individuals demonstrate long-lived serum IgG antibody by three weeks post infection. Any patient whose acute phase serum tests negative for IgM antibody needs to have a convalescent phase specimen submitted for testing. Specimens should be centrifuged and 1–2 ml of serum submitted at refrigerated temperature to the Vermont Department of Health Laboratory.

##### *Cerebrospinal fluid:*

Collect 1-2 ml of cerebrospinal fluid (CSF) as early as possible. IgM antibody is detectable in CSF in most (99%) patients by the onset of symptoms, but is relatively short-lived in CSF compared with serum. Detection of IgM in CSF confirms recent infection with West Nile virus, although infection cannot be definitively ruled out if IgM is not detected. IgG antibody in CSF often does not reach detectable levels and is therefore not a sensitive indicator of infection. Specimens should be submitted frozen to the Vermont Department of Health Laboratory.

All specimens should be accompanied by a completed form VDHL Micro 214 “Request

for Serological Examination for Bacterial, Fungal, Parasitic & Viral Agents” and a CDC History Form # 50.34 (rev 11/90). Date of onset must be included; otherwise CDC will not perform testing.

Forms and serology mailers can be obtained by contacting the VDHL at (800) 660-9997, extension 7560.

### **Surveillance for possible health effects of pesticide exposure**

Data will be collected prospectively on reports to the poison control center of possible health effects of pesticide exposure if adult mosquito suppression for WNV is conducted. Information collected may include name of caller, county of residence, age and gender of exposed or affected individual, location of exposure, mode of exposure, symptoms or complaints, and involvement of a health care provider. This information will be used to identify:

- 1) Serious, unusual, or repeated acute health effects that show a pattern of association with local or aerial spraying that might warrant further evaluation. More intensive evaluation might include collection of detailed case histories for a subset of reports, or review of emergency department records.
- 2) Unexpected routes of exposure that might warrant investigation.
- 3) Frequent problems in responding to concerns and inquiries about pesticide health effects, including knowledge gaps.

Public health nurses at the Department of Health will contact local emergency departments to conduct active surveillance for possible health effects of exposure to pesticides during the week following a spray event. The goal of active surveillance will be to identify serious, unusual, or repeated acute health effects that show a pattern of association with local or aerial spraying that might need further evaluation.



## Appendix B

### Mosquito Surveillance

#### **Larval Mosquito Surveillance Methods**

Surveillance activities for immature (larvae and pupae) mosquitoes involve the mapping and characterization of aquatic habitats where mosquitoes breed. Mosquito breeding can occur anywhere where there is standing water available. Examples include tires, pails, garbage cans, plant pots, clogged rain gutters, bird baths, storm drains, unchlorinated swimming pools, and swimming pool covers. Mosquito breeding can also occur in natural water-filled areas, such as wetlands, temporarily flooded areas, or stream edges.

The standard one-pint dipper will be used for sampling (dipping) for mosquito larvae. Recommendations for successful dipping include:

- Larvae at or under the water surface are sensitive to water movement and shadows; try to minimize both.
- The dipper cup should be directed at making a quick but gentle sweep at the water surface.
- Enter the water at an angle, so that surface water begins entering the cup. Continue sweeping across the water surface until the cup is one-half to three-quarters full. Avoid filling the cup all the way, as larvae can escape before the dipper is righted and removed from the water.
- Larvae that are disturbed from the water surface will escape to deeper water, resurfacing only when air is needed. Pausing between dips or changing dipping locations will allow enough time for larvae to resurface.
- If there is vegetation in the water, try dipping where the water meets the leaves or stems.

Samples will be recorded as the number of larvae per dip on the Mosquito Breeding Site Survey Form. Larvae will be identified to species through the use of larval mosquito identification keys.

#### **Adult Mosquito Surveillance Methods**

Monitoring mosquitoes in a consistent fashion provides information about species present and seasonal population trends among species. Mosquito surveillance will start in the spring when air temperatures warm to greater than or equal to 50° F. Surveillance will likely end in September or October, unless extended surveillance is indicated due to warm air temperatures or evidence of virus. Data from consecutive seasons will provide the most thorough baseline data. Data on numbers of mosquitoes both pre- and post-pesticide application will provide a means for evaluating mosquito control efforts.

Carbon dioxide-baited CDC light traps primarily collect host-seeking, non-blooded female mosquitoes. Traps will be set in the late afternoon or early evening and retrieved the following morning. Traps will be set and attended on a regular basis, as resources

permit. Once productive trapping sites are located, traps will be operated consistently at the same sites, as resources permit. Samples will be identified to species and sorted into pools. A mosquito 'pool' is defined as a group of ten to fifty mosquitoes of the same species that were trapped at the same location on the same night. All samples will be stored on dry ice, in the event that viral testing is later indicated. Global positioning system (GPS) units will be used as resources permit to map survey areas.

Following blood feeding, mosquitoes seek sheltered areas in which to rest and digest the bloodmeal into eggs. Once eggs have formed, the gravid female seeks a site to lay (oviposit) her eggs. The CDC gravid trap is specifically designed to collect mosquitoes seeking oviposition sites. Modified gravid traps will be set in the late afternoon or early evening and retrieved the following morning. Collections from each trap will be identified to species and sorted into pools. All samples will be stored on dry ice, in the event that viral testing is later indicated.

Ground surveys may also be used to detect resting populations. Live, fresh specimens will be collected from resting areas and used to determine population densities. Both natural (bridges, porches, culverts, vegetation) and artificial (red boxes, black boxes, nail-keg shelters) resting sites may be used for this purpose.

Areas targeted for mosquito surveillance will be selected based upon perceived risk (e.g., more densely populated areas, known flooding tendencies), geographic location, and convenience.

### **Adult Mosquito West Nile Viral Testing**

Although questions remain regarding the competence of some mosquito species as vectors for West Nile virus, present knowledge places emphasis on the following species for viral testing: all members of the genus *Culex* (e.g., *Cx. pipiens*, *Cx. restuans*, *Cx. salinarius*), and the suspected secondary vectors of the genus *Aedes* and *Ochlerotatus* (e.g., *japonicus*, *triseriatus*, *vexans*, *sollicitans*).

Following sorting and identification of mosquito specimens, female mosquitoes of the same species from each trap will be pooled. Pools will be tested with the VecTest™ assay and/or shipped to the New York State Department of Health Laboratory for West Nile virus testing.

## Appendix C

### Information on Pesticides

U.S. EPA Factsheet on Pesticides and Mosquitoes

<http://www.epa.gov/pesticides/factsheets/pesticides4mosquitos.htm>

U.S. EPA Factsheet on Synthetic Pyrethroids for Mosquito Control

<http://www.epa.gov/pesticides/factsheets/pyrethroids4mosquitos.htm>

U.S. EPA Factsheet on Larvicides for Mosquito Control

<http://www.epa.gov/pesticides/citizens/larvicides4mosquitos.htm>

National Pesticide Telecommunications Network (NPTN) Pyrethrin and Pyrethroids (pdf)

<http://ace.orst.edu/info/npic/factsheets/pyrethrins.pdf>

NPTN Factsheet on Piperonyl Butoxide (pdf)

<http://ace.orst.edu/info/npic/factsheets/pbogen.pdf>

NPTN Factsheet on Bacillus Thuringiensis (pdf)

<http://ace.orst.edu/info/npic/factsheets/BTgen.pdf>

NPTN Factsheet on DEET (pdf)

<http://ace.orst.edu/info/npic/factsheets/DEETgen.pdf>

## Appendix D

### Responses to Public Comments

A draft of this working plan was made available to the public on May 14, 2001 for comment before the Final Working Plan was adopted. The Department of Health received eleven comments electronically, and ten written comments through the mail. Twenty of the comments were from individuals, and one was from an organization. Some of these comments were incorporated into this Final Working Plan. These responses were compiled in June 2001.

Several comments thanked the Departments of Health and Agriculture, Food & Markets for developing a rational response plan, and applauded the plan for acknowledging surveillance as the basis for informed decision making. In addition, an editorial in The Burlington Free Press (May 31, 2001) stated, “The Vermont Health Department and Agriculture Department appear to recognize the complexities and have produced a solid West Nile surveillance and response plan...”. This appendix summarizes many of the comments and the Department of Health’s response.

**Comment:** Public education should include information about what West Nile virus is, and how it is transmitted.

**Response:** The plan has been modified to include specific reference to these educational efforts.

**Comment:** Public education should include the relative risk of pesticide use versus the risk of infection with West Nile virus, the potential dangers of the use of insecticides and repellents around the home, and instructions on how the public can register to be notified of spraying events.

**Response:** The plan has been modified to include specific reference to these educational efforts.

**Comment:** Public education should include the avoidance of mosquitoes and the reduction of mosquito breeding habitats.

**Response:** The Vermont Departments of Health and Agriculture, Food & Markets agree. The plan emphasizes the importance of public education regarding these issues. Delivery of these messages will be increased in the event that West Nile virus is documented in Vermont.

**Comment:** The use of pesticides should be a last resort. I am opposed to pesticide use because pesticides may have lasting impacts on people, animals, and the environment.

**Response:** Pesticides will be used only as a last resort according to this plan. Every effort has been made in this plan to emphasize public education, mosquito habitat source reduction, and the use of biological insecticides that target only mosquito larvae in the aquatic habitat. However, management of a mosquito-borne human pathogen with no effective treatment for human cases requires the consideration of chemical insecticides as

a last resort if all other measures fail, in order to suppress potentially infective adult mosquito populations. The New York City Department of Health has prepared a detailed evaluation of the potential environmental impacts from the use of pesticides for West Nile virus control. This document, Adult Mosquito Control Programs Draft Environmental Impact Statement, is available at [www.nyc.gov/health](http://www.nyc.gov/health).

**Comment:** I am opposed to the use of insecticides against mosquito-borne illness for the following reasons: reductions in mosquito populations would be temporary and limited in geographic area; mosquito control would not eliminate the virus in other hosts (e.g. birds); damage to non-target species may result in an increase in the number of mosquitoes by eliminating natural predators of mosquitoes.

**Response:** The effectiveness of adult mosquito suppression in reducing West Nile virus transmission continues to be evaluated by the Centers for Disease Control and Prevention (CDC).

**Comment:** The Department of Agriculture should pre-establish an audit system to ensure recommended mosquito suppression activities are properly carried out.

**Response:** The Department of Agriculture will be the lead agency in providing technical assistance to ensure suppression activities are properly carried out. All suppression activities will be monitored by the Department of Agriculture.

**Comment:** I am opposed to the use of malathion in Vermont.

**Response:** The Vermont Departments of Health and Agriculture, Food & Markets will not recommend the use of malathion.

**Comment:** Why should some areas be treated with insecticide and others not?

**Response:** Spraying of pesticides will only be done as a last resort, in areas with documented West Nile virus activity suggesting an imminent risk to human health.

**Comment:** Any non-organic chemical pesticide application should be by ground application, rather than aerial application.

**Response:** The application method will be chosen by the Vermont Department of Agriculture, and will depend upon the size and topography of the area to be treated, and the vector species that are targeted.

**Comment:** People should have the option of requesting exemption from spraying, and these requests should be honored.

**Response:** The Vermont Department of Agriculture maintains a registry of exemption from spraying requests. The Department of Agriculture will make every effort to ensure that when possible, all requests for exemption from spraying be honored. The plan has been modified to include specific reference to both notification of, and exemption from, spraying.

**Comment:** The human health risks from pesticide exposure are greater than the risk posed by infection with West Nile virus.

**Response:** To date, there have been no documented cases in Vermont of human infection with West Nile virus. Only one out of four people who are infected with the virus experience symptoms. These symptoms are most often mild, and do not require medical attention. However, approximately one percent of people who are infected develop severe illness, such as encephalitis or meningitis, which can be fatal. The Environmental Protection Agency (EPA) has determined that the insecticides labeled nationally for adult mosquito control pose minimal risks to human health and the environment when used according to the label.

**Comment:** Public notice via mailings should be given a minimum of 30 days prior to spraying.

**Response:** If recommended, adult mosquito suppression activities need to be carried out as quickly as possible in order to impact the targeted vectors. Public notice will be given at least 24 hours prior to any ground level or aerial spraying of adulticides.

**Comment:** Public notification of spraying should include the statement that pesticides are not considered safe by the EPA, recommendations on how to reduce exposure, and specific notification of hospitals, schools, and other buildings to take extra precautionary measures to prevent pesticides from making their way inside buildings.

**Response:** The EPA has determined that the insecticides labeled nationally for adult mosquito control pose minimal risks to human health and the environment when used according to the label. Recommendations on how to reduce exposure, such as turning off air intake on air conditioning units and bringing children's toys inside, will be provided. Local officials will be encouraged to notify institutions in their area.

**Comment:** A toll free spray hotline and web site should be established to enable the public to find out when and where pesticides are being used.

**Response:** Experience from other states indicates that hotlines and web sites demand significant resources. These will be considered for implementation. Public notice will be given prior to any ground level or aerial spraying of pesticides.

**Comment:** The final decision about spraying should be made by the Vermont Department of Health, and not by local officials. Irrational fear of chemicals and pesticides should not dictate policy in matters of public health.

**Response:** It is important that local officials be involved in decisions that will affect their jurisdictions. The commissioners of Agriculture and Health will recommend activities that should be implemented, based upon all available data. The Commissioner of Health has the ultimate authority in situations considered to be a public health emergency.

**Comment:** My family no longer goes camping due to the threat of West Nile virus. One sick or dead person is too many. The state must do everything in its power, including spraying pesticide, to ensure our safety. Spraying pesticide should not be considered only as a last resort.

**Response:** Individual risk of infection with West Nile virus is very low. The approach toward management of this virus and the mosquitoes that transmit it as described in this plan will serve to minimize the risk of human exposure.

**Comment:** Surveillance for health effects of exposure to pesticides is inadequate, because it will not capture health effects that are not reported to the Poison Control Center. The plan should designate institutions to receive reports of illness, and identify those institutions for the public. Toll free numbers should be established for health care providers to request treatment protocols and report exposures and for individuals who believe they have been exposed.

**Response:** The Vermont Department of Health agrees that surveillance measures outlined in the working plan may not capture health effects that are not reported to the Poison Control Center. Many signs or symptoms that might be related to pesticide exposure are non-specific and could be confused with other conditions or caused by other exposures. Also, individuals with symptoms may not seek medical care. However, it is prudent to monitor the nature and extent of concerns and common outcomes to verify that no severe health effects are occurring.

Public health nurses at Department of Health district offices will contact local emergency departments to conduct active surveillance for possible health effects of exposure to pesticides during the week following a spray event. The plan has been modified to include these efforts.

In addition, in July 2001 a Disease Control Bulletin focusing on West Nile virus was mailed to physicians around the state. This publication contained information about the possible health effects of common insect repellants and mosquito control products. The Environmental Protection Agency's handbook, *Recognition and Management of Pesticide Poisonings*, will be mailed to emergency departments around the state. The Department of Health is in the process of implementing a 24-hour toll free number for physician reporting of selected communicable diseases and syndromes. The Department of Health currently maintains a toll free number for the public.

**Comment:** We should concentrate our efforts on immunization rather than a futile attempt at mosquito control.

**Response:** In its national guidelines for West Nile virus surveillance, the CDC lists vaccine development for animals and humans as a research priority.

**Comment:** A representative from the Department of Environmental Conservation should be included on the Arboviral Task Force, and the Commissioner of Environmental Conservation should be involved in the decision to recommend implementing Phase III.

**Response:** The Agency of Natural Resources is well represented on the Arboviral Task Force. Members include the Department of Fish & Wildlife, the Department of Forests, Parks & Recreation, and the Pesticide Advisory Council (including water quality). The Secretary of the Agency of Natural Resources has representatives on the Arboviral Task

Force, and has the opportunity to provide input into the program.

**Comment:** The plan should qualify the recommendation to use DEET because it is associated with health effects, and it should not be used in combination with other pesticides.

**Response:** The plan refers to the use of personal protective measures, including the use of the repellent DEET, as a means of preventing mosquito bites. DEET is the active ingredient recommended for use as a mosquito repellent by the CDC. DEET repellents come in many different concentrations beginning at about five percent. In general, the higher the concentration, the higher the protection, but the risk of adverse health effects also increases. The Vermont Department of Health West Nile virus fact sheet provides information on personal protective measures as well as the proper use of DEET.

**Comment:** The Department of Health should educate the public about how to dispose of tires, and what services are available to drill holes in old tires to prevent them from holding water.

**Response:** A single layer of tires that is exposed to direct sunlight will likely become too warm to support the growth of mosquito larvae. Similarly, the top layer or two of a pile of tires in direct sunlight will probably become too warm for mosquito larvae to survive. However, tires underneath the top layers that are not in direct sunlight are potential breeding habitat for some mosquito species. Concerns about local habitats that may support mosquito breeding should be directed to local town health officers.

**Comment:** What is the incubation period of the virus?

**Response:** The incubation period in people ranges from 3 to 15 days.

**Comment:** Is there only a period of illness following infection, or could it recur intermittently?

**Response:** Only about one in four people who are bitten by a mosquito infected with West Nile virus will have symptoms due to infection with the virus. These symptoms are usually mild and might include a fever, headache, or body aches. More severe illness, such as encephalitis or meningitis, is much less common, and occurs in only about one percent of people who are infected. Illness does not recur.

**Comment:** Surveillance should be expanded to include testing bats for West Nile virus.

**Response:** While bats infected with West Nile virus have been identified, testing dead birds remains the most sensitive surveillance indicator for the virus. In addition, because bats tested for West Nile would first have to be tested for rabies, including bats in surveillance efforts would overwhelm laboratory capacity for testing. For these reasons, testing bats will not be included in routine surveillance for West Nile virus. This strategy is consistent with the CDC's national West Nile surveillance guidelines.



**Comment:** The goal of preventing human infection is unrealistic, and may require unnecessarily strong or sustained actions.

**Response:** The goal of the plan has been modified.

**Comment:** Many dead birds were observed several years ago at the former Moran Generating station at the waterfront in Burlington.

**Response:** There is no evidence that West Nile virus was present in the Western Hemisphere prior to 1999, so these bird deaths must have been due to another cause.

**Comment:** Information about which specific pesticide formulations are proposed for use is missing from the plan.

**Response:** Appendix E contains information on pesticide formulations that would potentially be used.